

**Amendment and Response**

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Applicant(s): John H. KO et al.

Serial No.: 10/009,928

Filed: 11 April 2002

For: SILICONE ADHESIVES, ARTICLES AND METHODS

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**Amendments to the Claims**

This listing of claims replaces all prior versions, and listings, of claims in the above-identified application:

1. (Currently Amended) An adhesive prepared from components comprising:
  - (a) a polydiorganosiloxane having the general formula  $R^1R_2SiO(R_2SiO)_nSiR_2R^1$  and a number average molecular weight of at least 20,000, wherein each R is independently a monovalent hydrocarbon group, each  $R^1$  is independently an alkenyl group, and n is an integer;
  - (b) a polydiorganosiloxane having the general formula  $R^1R_2SiO(R_2SiO)_m(R^1RSiO)_nSiR_2R^1$  and a number average molecular weight of less than 20,000, wherein each R and  $R^1$  is independently a monovalent hydrocarbon group, at least two  $R^1$  groups are alkenyl groups, and m and n are integers the sum of which provide an alkenyl equivalent weight of about 250 to about 10,000;
  - (c) an organopolysiloxane MQ resin which contains  $(R^2)_3SiO_{1/2}$  units and  $SiO_2$  units in a molar ratio in the range of 0.6:1 to 1:1, wherein each  $R^2$  is independently selected from the group of alkyl groups, alkenyl groups, or hydroxyl groups, wherein at least 95 mole percent of all  $R^2$  groups are methyl groups;
  - (d) an organohydrogenpolysiloxane free of aliphatic unsaturation having an average of at least 2 silicon-bonded hydrogen atoms in each molecule, in a quantity sufficient to provide from 1 to 40 silicon-bonded hydrogen atoms per alkenyl group in components (a) through (c); and
  - (e) a Group VIIIB-containing catalyst in a quantity sufficient to provide 0.1 to 1,000 weight parts Group VIIIB metal for each one million weight parts of the combined quantity of components (a) through (d);

wherein when the adhesive is disposed on a propylene/ethylene copolymer backing at a coating weight of 0.8 grams/154.8 cm<sup>2</sup> and adhered to a polypropylene plate displays a 180° peel force of

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at least about 5 N/dm when measured at 30.5 cm/minute and room temperature.

2. (Original) The adhesive of claim 1 wherein the organopolysiloxane MQ resin includes both nonfunctional and functional MQ resins.
3. (Original) The adhesive of claim 2 wherein the functional MQ resin includes alkenyl groups.
4. (Currently Amended) An adhesive prepared from components comprising:
  - (a) a polydiorganosiloxane having the general formula  $R^1R_2SiO(R_2SiO)_nSiR_2R^1$  and a number average molecular weight of at least 20,000, wherein each R is independently a monovalent hydrocarbon group, each  $R^1$  is independently an alkenyl group, and n is an integer;
  - (b) a polydiorganosiloxane having the general formula  $R^1R_2SiO(R_2SiO)_m(R^1RSiO)_nSiR_2R^1$  and a number average molecular weight of less than 20,000, wherein each R and  $R^1$  is independently a monovalent hydrocarbon group, at least two  $R^1$  groups are alkenyl groups, and m and n are integers the sum of which provide an alkenyl equivalent weight of about 250 to about 10,000;
  - (c) an organopolysiloxane MQ resin which contains  $(R^2)_3SiO_{1/2}$  units and  $SiO_2$  units in a molar ratio in the range of 0.6:1 to 1:1, wherein each  $R^2$  is independently selected from the group of alkyl groups, alkenyl groups, or hydroxyl groups, wherein at least 95 mole percent of all  $R^2$  groups are methyl groups;
  - (d) an organohydrogenpolysiloxane free of aliphatic unsaturation having an average of at least 2 silicon-bonded hydrogen atoms in each molecule, in a quantity sufficient to provide from 1 to 40 silicon-bonded hydrogen atoms per alkenyl group in components (a) through (c); and
  - (e) a Group VIII B-containing catalyst in a quantity sufficient to provide 0.1 to 1,000

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weight parts Group VIII/B metal for each one million weight parts of the combined quantity of components (a) through (d);

wherein The adhesive of claim 1 when the adhesive is disposed on a fluorosilicone-coated polyethylene terephthalate release liner and a propylene/ethylene copolymer backing at a coating weight of 0.8 grams/154.8 cm<sup>2</sup> to form a laminate, and when adhered to a glass plate, displays a 180° release force of no greater than about 20 N/dm when measured at 30.5 cm/minute and room temperature.

5. (Original) The adhesive of claim 4 which displays a release force of no greater than about 15 N/dm.
6. (Original) The adhesive of claim 5 which displays a release force of no greater than about 10 N/dm.
7. (Original) The adhesive of claim 6 which displays a release force of no greater than about 5 N/dm.
8. (Currently Amended) The adhesive of claim [[1]] 4 when disposed on a propylene/ethylene copolymer backing at a coating weight of 0.8 grams/154.8 cm<sup>2</sup> and adhered to a polypropylene plate displays a 180° peel force of at least about 5 N/dm when measured at 30.5 cm/minute and room temperature.
9. (Original) The adhesive of claim 1 which is a pressure sensitive adhesive.
10. (Original) An adhesive article comprising a substrate having disposed on at least one major surface the silicone-based adhesive of claim 1.

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11. (Original) The adhesive article of claim 10 wherein the organopolysiloxane MQ resin includes both nonfunctional and functional MQ resins
12. (Original) The adhesive article of claim 10 further comprising a release liner disposed on the adhesive.
13. (Currently Amended) ~~The An~~ adhesive article of claim 10 wherein the adhesive when disposed on a fluorosilicone-coated polyethylene terephthalate release liner and a propylene/ethylene copolymer backing at a coating weight of 0.8 grams/154.8 cm<sup>2</sup> to form a laminate, and when adhered to a glass plate, displays a 180° release force of no greater than about 20 N/dm when measured at 30.5 cm/minute and room temperature comprising a substrate having disposed on at least one major surface the silicone-based adhesive of claim 4.
14. (Original) The adhesive article of claim 13 wherein the adhesive displays a release force of no greater than about 5 N/dm.
15. (Currently Amended) The adhesive article of claim ~~10~~ 13 wherein the adhesive when disposed on a propylene/ethylene copolymer backing at a coating weight of 0.8 grams/154.8 cm<sup>2</sup> and adhered to a polypropylene plate displays a 180° peel force of at least about 5 N/dm when measured at 30.5 cm/minute and room temperature.
16. (Currently Amended) The adhesive article of claim 10 wherein the ~~backing~~ substrate comprises a puncturable material.
17. (Original) The adhesive article of claim 10 wherein the adhesive is a pressure sensitive adhesive.

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18. (Original) An analytical receptacle comprising a surface and a cover tape adhered to the surface; wherein the cover tape comprises a backing and the adhesive of claim 1 disposed on at least one major surface of the backing and in contact with the receptacle surface.
19. (Original) The analytical receptacle of claim 18 further comprising one or more reservoirs in the form of a well or channel.
20. (Original) The analytical receptacle of claim 18 wherein the analytical receptacle comprises a substantially continuous tape.
21. (Original) The analytical receptacle of claim 18 wherein the adhesive is a pressure sensitive adhesive.
22. (Currently Amended) The An analytical receptacle comprising a surface and a cover tape adhered to the surface; wherein the cover tape comprises a backing and the adhesive of claim 4-18 disposed on at least one major surface of the backing and in contact with the receptacle surface wherein the adhesive when disposed on a fluorosilicone-coated polyethylene-terephthalate release liner and a propylene/ethylene copolymer backing at a coating weight of 0.8 grams/154.8 cm<sup>2</sup> to form a laminate, and when adhered to a glass plate, displays a 180° release force of no greater than about 20 N/dm when measured at 30.5 cm/minute and room temperature.
23. (Original) The analytical receptacle of claim 22 wherein the adhesive displays a release force of no greater than about 5 N/dm.
24. (Currently Amended) The analytical receptacle of claim ~~18~~ 22 wherein the adhesive

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- when disposed on a propylene/ethylene copolymer backing at a coating weight of 0.8 grams/154.8 cm<sup>2</sup> and adhered to a polypropylene plate displays a 180° peel force of at least about 5 N/dm when measured at 30.5 cm/minute and room temperature.
25. (Original) The analytical receptacle of claim 18 further comprising one or more reservoirs including a liquid therein during use.
26. (Original) The analytical receptacle of claim 25 wherein the liquid comprises dimethyl sulfoxide, water, acetonitrile/water, methanol, ethanol, or mixtures thereof.
27. (Original) The analytical receptacle of claim 18 comprising a microtiter plate.
28. (Original) The analytical receptacle of claim 18 comprising a microfluidic device comprising a substrate and one or more channels therein.
29. (Original) The analytical receptacle of claim 18 comprising a substantially continuous polymeric strip comprising a plurality of reservoirs at predetermined intervals along its length.
30. (Original) The analytical receptacle of claim 29 wherein the reservoirs are uniformly spaced.
31. (Currently Amended) An analytical receptacle comprising a surface comprising polypropylene, polystyrene, or combination thereof, and a cover tape adhered to the surface; wherein the cover tape comprises a backing and an adhesive disposed on at least one major surface of the backing and in contact with the receptacle surface, wherein the adhesive is prepared from components comprising:

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- (a) a polydiorganosiloxane having the general formula  $R^1R_2SiO(R_2SiO)_nSiR_2R^1$  wherein each R is independently a monovalent hydrocarbon group, each  $R^1$  is independently an alkenyl group and n is an integer;
- (b) an organopolysiloxane MQ resin which contains  $(R^2)_3SiO_{1/2}$  units and  $SiO_2$  units in a molar ratio in the range of 0.6:1 to 1:1, wherein each  $R^2$  is independently selected from the group of alkyl groups, alkenyl groups, or hydroxyl groups, wherein at least 95 mole percent of all  $R^2$  groups are methyl groups;
- (c) an organohydrogenpolysiloxane free of aliphatic unsaturation having an average of at least 2 silicon-bonded hydrogen atoms in each molecule, in a quantity sufficient to provide from 1 to 40 silicon-bonded hydrogen atoms per alkenyl group in component (a) and component (b) if present; and
- (d) a Group VIII-B-containing catalyst in a quantity sufficient to provide 0.1 to 1,000 weight parts Group VIII-B metal for each one million weight parts of the combined quantity of components (a) through (c);

wherein when the adhesive is disposed on a propylene/ethylene copolymer backing at a coating weight of 0.8 grams/154.8 cm<sup>2</sup> and adhered to a polypropylene plate displays a 180° peel force of at least about 5 N/dm when measured at 30.5 cm/minute and room temperature.

32. (Allowed) An analytical receptacle comprising a surface and a cover tape adhered to the surface; wherein the cover tape comprises a backing and an adhesive disposed on at least one major surface of the backing and in contact with the receptacle surface, wherein the adhesive is prepared from components comprising:
- (e) a polydiorganosiloxane having the general formula  $R^1R_2SiO(R_2SiO)_nSiR_2R^1$  wherein each R is independently a monovalent hydrocarbon group, each  $R^1$  is independently an alkenyl group and n is an integer;
  - (f) an organopolysiloxane MQ resin which contains  $(R^2)_3SiO_{1/2}$  units and  $SiO_2$  units in a molar ratio in the range of 0.6:1 to 1:1, wherein each  $R^2$  is independently selected

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from the group of alkyl groups, alkenyl groups, or hydroxyl groups, wherein at least 95 mole percent of all  $R^2$  groups are methyl groups;

- (g) an organohydrogenpolysiloxane free of aliphatic unsaturation having an average of at least 2 silicon-bonded hydrogen atoms in each molecule, in a quantity sufficient to provide from 1 to 40 silicon-bonded hydrogen atoms per alkenyl group in component (a) and component (b) if present; and
- (h) a Group VIII B-containing catalyst in a quantity sufficient to provide 0.1 to 1,000 weight parts Group VIII B metal for each one million weight parts of the combined quantity of components (a) through (c);

wherein the adhesive when disposed on a fluorosilicone-coated polyethylene terephthalate release liner and a propylene/ethylene copolymer backing at a coating weight of 0.8 grams/154.8  $\text{cm}^2$  to form a laminate, and when adhered to a glass plate, displays a 180° release force of no greater than about 20 N/dm when measured at 30.5 cm/minute and room temperature.

33. (Currently Amended) A method of making an adhesive comprising:

preparing a composition comprising:

- (a) a polydiorganosiloxane having the general formula  $R^1R_2SiO(R_2SiO)_nSiR_2R^1$  and a number average molecular weight of at least 20,000, wherein each R is independently a monovalent hydrocarbon group, each  $R^1$  is independently an alkenyl group, and n is an integer;
- (b) a polydiorganosiloxane having the general formula  $R^1R_2SiO(R_2SiO)_m(R^1R_2SiO)_nSiR_2R^1$  and a number average molecular weight of less than 20,000, wherein each R and  $R^1$  is independently a monovalent hydrocarbon group, at least two  $R^1$  groups are alkenyl groups, and m and n are integers the sum of which provide an alkenyl equivalent weight of about 250 to about 10,000;
- (c) an organopolysiloxane MQ resin which contains  $(R^2)_3SiO_{1/2}$  units and  $SiO_2$  units in a molar ratio in the range of 0.6:1 to 1:1, wherein each  $R^2$  is independently selected



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from the group of alkyl groups, alkenyl groups, or hydroxyl groups, wherein at least 95 mole percent of all  $R^2$  groups are methyl groups;

- (d) an organohydrogenpolysiloxane free of aliphatic unsaturation having an average of at least 2 silicon-bonded hydrogen atoms in each molecule, in a quantity sufficient to provide from 1 to 40 silicon-bonded hydrogen atoms per alkenyl group in components (a) through (c); and
- (e) a Group VIII B-containing catalyst in a quantity sufficient to provide 0.1 to 1,000 weight parts Group VIII B metal for each one million weight parts of the combined quantity of components (a) through (d); and

thermally curing the composition;

wherein when the adhesive is disposed on a propylene/ethylene copolymer backing at a coating weight of 0.8 grams/154.8 cm<sup>2</sup> and adhered to a polypropylene plate displays a 180° peel force of at least about 5 N/dm when measured at 30.5 cm/minute and room temperature.

34. (Original) A method of sealing an analytical receptacle comprising applying a cover tape comprising a backing and the adhesive of claim 1 disposed on at least one major surface thereof.
35. (New) An analytical receptacle comprising a surface comprising polypropylene, polystyrene, or combination thereof, and a cover tape adhered to the surface; wherein the cover tape comprises a backing and an adhesive disposed on at least one major surface of the backing and in contact with the receptacle surface, wherein the adhesive is prepared from components comprising:
- (i) a polydiorganosiloxane having the general formula  $R^1R_2SiO(R_2SiO)_nSiR_2R^1$  wherein each R is independently a monovalent hydrocarbon group, each  $R^1$  is independently an alkenyl group and n is an integer;
- (j) an organopolysiloxane MQ resin which contains  $(R^2)_3SiO_{1/2}$  units and  $SiO_2$  units in a

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molar ratio in the range of 0.6:1 to 1:1, wherein each  $R^2$  is independently selected from the group of alkyl groups, alkenyl groups, or hydroxyl groups, wherein at least 95 mole percent of all  $R^2$  groups are methyl groups;

- (k) an organohydrogenpolysiloxane free of aliphatic unsaturation having an average of at least 2 silicon-bonded hydrogen atoms in each molecule, in a quantity sufficient to provide from 1 to 40 silicon-bonded hydrogen atoms per alkenyl group in component (a) and component (b) if present; and
- (l) a Group VIII B-containing catalyst in a quantity sufficient to provide 0.1 to 1,000 weight parts Group VIII B metal for each one million weight parts of the combined quantity of components (a) through (c);

wherein the adhesive when disposed on a fluorosilicone-coated polyethylene terephthalate release liner and a propylene/ethylene copolymer backing at a coating weight of 0.8 grams/154.8 cm<sup>2</sup> to form a laminate, and when adhered to a glass plate, displays a 180° release force of no greater than about 20 N/dm when measured at 30.5 cm/minute and room temperature.

36. (New) An analytical receptacle comprising a surface and a cover tape adhered to the surface; wherein the cover tape comprises a backing and an adhesive disposed on at least one major surface of the backing and in contact with the receptacle surface, wherein the adhesive is prepared from components comprising:

- (m) a polydiorganosiloxane having the general formula  $R^1R_2SiO(R_2SiO)_nSiR_2R^1$  wherein each R is independently a monovalent hydrocarbon group, each  $R^1$  is independently an alkenyl group and n is an integer;
- (n) an organopolysiloxane MQ resin which contains  $(R^2)_3SiO_{1/2}$  units and  $SiO_2$  units in a molar ratio in the range of 0.6:1 to 1:1, wherein each  $R^2$  is independently selected from the group of alkyl groups, alkenyl groups, or hydroxyl groups, wherein at least 95 mole percent of all  $R^2$  groups are methyl groups;
- (o) an organohydrogenpolysiloxane free of aliphatic unsaturation having an average of at

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least 2 silicon-bonded hydrogen atoms in each molecule, in a quantity sufficient to provide from 1 to 40 silicon-bonded hydrogen atoms per alkenyl group in component (a) and component (b) if present; and

- (p) a Group VIII B-containing catalyst in a quantity sufficient to provide 0.1 to 1,000 weight parts Group VIII B metal for each one million weight parts of the combined quantity of components (a) through (c);

wherein when the adhesive is disposed on a propylene/ethylene copolymer backing at a coating weight of 0.8 grams/154.8 cm<sup>2</sup> and adhered to a polypropylene plate displays a 180° peel force of at least about 5 N/dm when measured at 30.5 cm/minute and room temperature.

37. (New) A method of making an adhesive comprising:

preparing a composition comprising:

- (f) a polydiorganosiloxane having the general formula  $R^1R_2SiO(R_2SiO)_nSiR_2R^1$  and a number average molecular weight of at least 20,000, wherein each R is independently a monovalent hydrocarbon group, each R<sup>1</sup> is independently an alkenyl group, and n is an integer;
- (g) a polydiorganosiloxane having the general formula  $R^1R_2SiO(R_2SiO)_m(R^1R_2SiO)_nSiR_2R^1$  and a number average molecular weight of less than 20,000, wherein each R and R<sup>1</sup> is independently a monovalent hydrocarbon group, at least two R<sup>1</sup> groups are alkenyl groups, and m and n are integers the sum of which provide an alkenyl equivalent weight of about 250 to about 10,000;
- (h) an organopolysiloxane MQ resin which contains (R<sup>2</sup>)<sub>3</sub>SiO<sub>1/2</sub> units and SiO<sub>2</sub> units in a molar ratio in the range of 0.6:1 to 1:1, wherein each R<sup>2</sup> is independently selected from the group of alkyl groups, alkenyl groups, or hydroxyl groups, wherein at least 95 mole percent of all R<sup>2</sup> groups are methyl groups;
- (i) an organohydrogenpolysiloxane free of aliphatic unsaturation having an average of at least 2 silicon-bonded hydrogen atoms in each molecule, in a quantity sufficient to

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provide from 1 to 40 silicon-bonded hydrogen atoms per alkenyl group in components

(a) through (c); and

- (j) a Group VIIIB-containing catalyst in a quantity sufficient to provide 0.1 to 1,000 weight parts Group VIIIB metal for each one million weight parts of the combined quantity of components (a) through (d); and

thermally curing the composition;

wherein the adhesive when disposed on a fluorosilicone-coated polyethylene terephthalate release liner and a propylene/ethylene copolymer backing at a coating weight of 0.8 grams/154.8 cm<sup>2</sup> to form a laminate, and when adhered to a glass plate, displays a 180° release force of no greater than about 20 N/dm when measured at 30.5 cm/minute and room temperature.

38. (New) A method of sealing an analytical receptacle comprising applying a cover tape comprising a backing and the adhesive of claim 4 disposed on at least one major surface thereof.